

## TRANSPORTING LIVE HIPPOBOSCIDS (DIPTERA)<sup>1</sup>

BY I. BARRY TARSHIS

Entomology Branch, Camp Detrick, Frederick, Maryland

During my investigations of the biology of *Stilbometopa impressa* (Bigot) and *Lynchia hirsuta* Ferris, Hippoboscidae of California quail, *Lophortyx californica californica* (Shaw and Nodder) (Tarshis, 1953), it was necessary to transport live flies from the field to the laboratory. Three different methods were evolved, which, together with the necessary equipment, are described herewith.

1. *Transporting Live Flies on Quail.* The most satisfactory and the easiest method of transporting live flies from the field to the laboratory after removal of the flies from wild trapped quail (Tarshis, 1952), was the placing of the flies on quail in fly-proof cages. Quail used for transporting flies were brought into the field from the home laboratory as it is a usual requirement that all trapped quail be released in the area from which they are taken, after the flies are removed and all other necessary procedures or observations are completed.

When the flies are to be introduced in the feathers, the bird is placed on its back in the palm of the hand and its left wing is raised (this will be the wing towards the worker's right). The total number of flies to be placed on the bird are slid out of a shell vial into the crotch formed by the bird's wing and body. The wing is then carefully folded back over the flies and held closed so that the flies will not escape. The bird is laid on its back in the cage and the hand very gently removed. If this procedure is meticulously followed the bird will remain motionless for at least

<sup>1</sup>From the Department of Entomology and Parasitology, University of California, Berkeley, California.

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five to ten minutes. Laying the bird on its back in this manner seems to put it in a state of hypnosis, and meanwhile the flies readily scurry under the feathers.

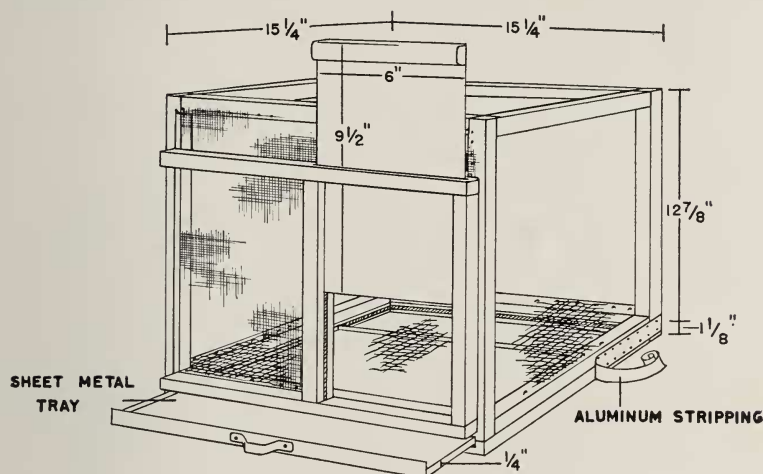


Fig. 1. Fly-proof cage used for transporting quail and live flies from the field to the laboratory.

Only a limited number of flies should be placed on one bird for each trip. One adult quail will tolerate as many as 15 flies of either species of hippoboscid, and a juvenile bird about 10 flies. Birds on which 25 or more flies were placed died of exsanguination.

It was found most desirable to place only one bird carrying flies in each cage. The more birds that are kept in a cage the greater the risk that flies leaving the birds for deposition of prepuparia or for other reasons will be captured or trampled on by the birds. Also, with more than one bird in a cage there is always a great deal of commotion which especially disturbs the gravid female flies, often causing them to deposit their young prematurely. If space is extremely limited two birds may be placed in a single cage, but never more.

The cage shown in Fig. 1 has been found most suitable for transporting live flies on birds. It has an exactly 1 x 1-inch fir stock framework covered on five sides with

No. 16 mesh bronze screen cloth. The bottom of the cage has a  $\frac{1}{2}$ -inch galvanized hardware cloth floor with a No. 28 gauge galvanized sheet metal collection tray placed on runners 1-inch below this floor. The front of the cage is fitted with a sliding galvanized sheet metal door (No. 28 gauge).

2. *Shipping Live Flies by Mail.* Mailing live flies in cardboard mailing tubes was also tried by the author, but did not prove as successful as the preceding method or the third method described below.

The captured flies were placed in shell vials (24 mm. wide and 95 mm. long) stoppered with perforated, screened corks. These corks were made by removing a large center core from each and then gluing a circle of 1/16-inch mesh nylon bobbinette over the opening on the bottom of the cork. Several of these vials were placed in an 8-inch cardboard mailing tube, cork end up. The metal mailing tube lid was perforated in several places and the underneath surface of the lid was lined with No. 16 mesh bronze screen cloth to prevent loss of flies if a vial broke in transit. The perforated corked vials were next to the perforated mailing tube lid which enabled the flies to get a sufficient amount of air. The bottom of the mailing tube and the spaces between the vials were tightly packed with cotton to prevent rattling or breakage. Where air mail service is available this method is quite adequate, but it is not very satisfactory with ordinary first class or second class postal service. Since hippoboscids cannot live long away from the host speed is of prime importance in transporting flies by mail.

3. *Shipping Live Flies in a Cold Temperature Cabinet.* This third method for transporting live hippoboscids was found to be very satisfactory. The technique was adapted from one used by Geigy (1948) to ship adult tsetse flies of the species *Glossina palpalis*. Geigy devised and used a cold temperature cabinet, which was adjusted to be kept at 8° C. (46.8° F.), to send adult flies from tropical Africa (Congo) to Basle, Switzerland, via air express.

The present author used the modified cabinet (Fig. 2) to

transport flies by automobile from various field stations to headquarters (distances of 70 to 300 miles). An Arctic Hamper was the basis for the cold temperature cabinet and a wooden stand with a wire basket was placed in the

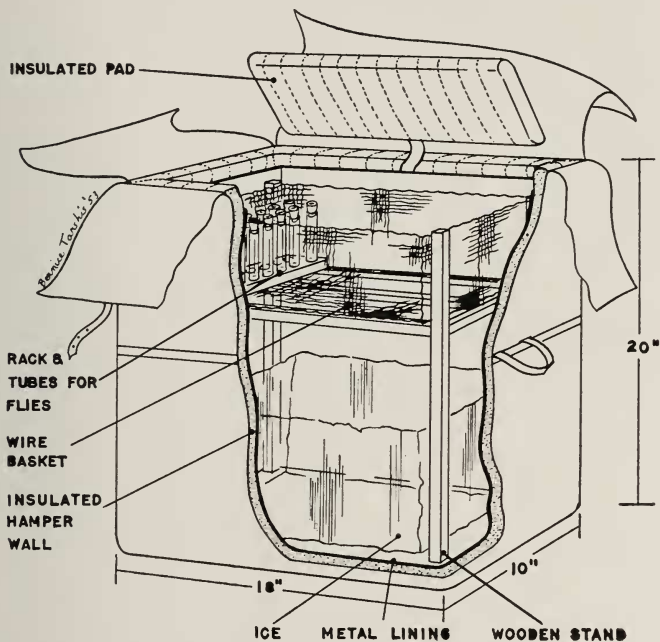


Fig. 2. Cut-away view of Arctic Hamper converted to cold temperature cabinet for transporting live flies from the field to the laboratory.

hamper. A 20-pound piece of ice was placed on the floor of the hamper to keep the temperature around 45° F. Adult flies of both species of quail *Hippoboscidae* were placed in vials with screened corks (the same vials as used for mailing flies). The vials were placed in racks which fitted into the wire basket in the hamper. The wooden stand was high enough above the ice that the vials did not get wet as the ice melted.

Flies shipped in the cold Arctic Hamper become rigid and motionless but revive quickly after 10 minutes in a

constant temperature cabinet set at 78°F. or when kept at room temperature (70°F.) for a period upwards to 60 minutes.

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